

(Part-I)

Q.2. Write short answers to any Five (5) question. (10)

(i) Differentiate between botany and zoology.

Ans

| Zoology | Botany |
|---|--|
| This division of biology deals with the study of animals. | This division of biology deals with the study of plants. |

(ii) How biotechnology helps mankind? Explain.

Ans Biotechnology deals with the practical application of living organisms to make substances for the welfare of mankind.

(iii) Differentiate between theory and law.

Ans The hypotheses that stand the test of time (often tested and never rejected), are called theories. A theory is supported by a great deal of evidence. Productive theory keeps on suggesting new hypotheses and so testing goes on. Many biologists take it as a challenge and exert greater efforts to disprove the theory. If a theory survives such doubtful approach and continues to be supported by experimental evidence, it becomes a law or principle.

(iv) How quantitative observations are better in biology? Explain.

Ans Quantitative observations are considered more accurate than qualitative ones because the former are invariable and measurable and can be recorded in terms of numbers.

(v) Write the biological name of man.

Ans *Homo Sapiens* is the scientific name of man.

(vi) What is the role of over-hunting in extinction?

Ans Over-hunting has been a significant cause of the extinction of hundreds of species and the endangerment of many more such as whales, ibex, urial, markhor (the national animal of Pakistan) etc. Commercial hunting, both legal and illegal, is the principal threat.

(vii) Define apoptosis.

Ans **Apoptosis:**

Apoptosis is one of the main types of programmed cell death. During apoptosis, cell shrinks and becomes rounded due to the breakdown of cytoskeleton by enzymes. Its chromatin undergoes condensation and nuclear envelope breaks. In this way, nucleus spreads in the form of several discrete chromatin bodies.

(viii) Give two advantages of apoptosis.

Ans **Advantages of Apoptosis:**

- 1- Apoptosis removes the damaged cell, preventing it from getting further nutrients, or to prevent the spread of infections.
- 2- Apoptosis also gives advantages during development. For example, during formation of fingers, the cells between them undergo apoptosis and the digits separate.

Q.3. Write short answers to any Five (5) questions. (10)

(i) What is the difference between apical meristems and lateral meristems?

Ans Apical meristems are located at the apices (tips) of roots and shoot. When they divide, they cause increase in the length of plant. Such growth is called primary growth, while lateral meristems are located on the lateral sides of roots and shoot. By dividing, they are responsible for increase in growth of plant parts. This growth is called secondary growth.

(ii) Differentiate between phagocytosis and pinocytosis.

Ans The two forms of endocytosis are phagocytosis (cellular eating) and pinocytosis (cellular drinking). In

phagocytosis, cell takes in solid material while in pinocytosis, cell takes in liquid in the form of droplets.

(iii) Define plasmolysis.

Ans In a hypertonic environment, a plant cell loses water and cytoplasm shrinks. The shrinking of cytoplasm is called plasmolysis.

(iv) What is meant by active site?

Ans Only a small portion of enzyme molecule is directly involved in catalysis. This catalytic region is known as active site. It recognizes and binds substrate and then carries out reaction.

(v) Who first used the term enzyme?

Ans In 1878, German physiologist Winhelm Kuhne first used the term enzyme.

(vi) Name only factors affecting the rate of enzyme action.

Ans 1- Temperature. 2- Substrate concentration.
3- pH.

(vii) Define aerobic respiration and anaerobic respiration.

Ans The cellular respiration occurring in the presence of oxygen is called aerobic respiration while the one that occurs in the absence of oxygen is called anaerobic respiration.

(viii) What is Krebs cycle?

Ans Krebs cycle:

In Krebs cycle, the pyruvic acid molecules are completely oxidized, along with the formation of ATP, NADH and FADH_2 . Before entering in Krebs cycle, pyruvic acid is changed into a two carbon compound called acetyl-CoA.

Q.4. Write short answers to any Six (6) questions. (12)

(i) Name three parts of large intestine.

Ans Parts of Large Intestine:

1- Caecum 2- Colon 3- Rectum

(ii) How water is important in our diet?

Ans Approximately 60% of the adult human body is composed of water. Nearly all life-sustaining chemical reactions require an aqueous environment. Water also functions as the environment in which water-soluble foodstuff is absorbed in the intestines and the waste products are eliminated in urine. Another essential role of water is to maintain body temperature through evaporation, as in sweating. Severe dehydration may result in cardiovascular problems.

(iii) Write the symptoms of diarrhoea and constipation.

Ans **Symptom of Diarrhoea:**

Diarrhoea is condition in which the sufferer has frequent watery, loose bowel movements. This condition may be accompanied by abdominal pain, nausea and vomiting.

Symptoms of Constipation:

Constipation is a condition where a person experiences hard faeces which are difficult to eliminate.

(iv) Differentiate between bolus and chyme.

Ans

| Bolus | Chyme |
|--|---|
| During the processes of chewing, lubrication and semi-digestion, the pieces of food are rolled up by the tongue into small, slippery, spherical mass called bolus. | The starch in our bite of bread and the protein in mutton have been partially digested and the food has been converted to soup-like mixture called chyme. |

(v) Which factors affect the rate of transpiration?

Ans Factors which affect the rate of transpiration are given below:

- 1- Temperature.
- 2- Air humidity.
- 3- Air movement.
- 4- Leaf surface area.

(vi) How do we classify blood groups in terms of the ABO blood group system?

Ans In this system, there are four different blood groups which are distinct from each other on the basis of specific antigens (antigen A and B) present on the surface of RBCs. A person having antigen A has blood group A, a person having antigen B has blood group B, a person having both antigens has blood group AB, and a person having none of the A and B antigens has blood group O.

(vii) What is pus? How is it formed?

Ans WBCs die in the process of killing the germs. These dead cells accumulate and make the white substance called pus, seen at infection sites.

(viii) What role root hair play in life of plants?

Ans Root hairs provide large surface area for absorption. They grow out into the spaces between soil particles where they are in direct contact with water. The cytoplasm of root hairs has higher concentration of salts than soil water, so water moves by osmosis into root hairs. Salts also enter root hairs by diffusion or active transport.

(ix) Define cohesion tension theory.

Ans According to this theory, the force which carries water (and dissolved materials) upward through the xylem is transpirational pull. Transpiration creates a pressure difference that pulls water and salts up from roots.

(Part-II)

Note: Attempt any Three (3) questions.

Q.5.(a) What is meant by taxonomy? Describe taxas of taxonomy orderly. (3)

Ans The groups into which organisms are classified are known as taxonomic categories or taxa (singular "taxon"). The taxa form a ladder, called taxonomic hierarchy. All organisms are divided into five kingdoms. So kingdom is the largest taxon.

Taxa of taxonomy:

On the basis of similarities, each kingdom is further divided into smaller taxa in the following way:

Phylum: A phylum is a group of related classes.

Class: A class is a group of related orders.

Order: An order is a group of related families.

Family: A family is a group of related genera.

Genus: A genus is a group of related species.

Species: A species consists of similar organisms.

(b) Explain any four careers related with biology. (4)

Ans → Farming:

It deals with the development and maintenance of different types of farm. For example, in some farms, animal breeding technologies are used for the production of animals which are better protein and milk source. In poultry farms, chicken and eggs are produced. Similarly in fruit farms, different fruit yielding plants are grown. A student who has gone through the professional course of agriculture, animal husbandry or fisheries etc. can adopt this profession.

Forestry:

In forestry, professionals look after natural forests and advise to the government for planting and growing artificial forests. Many universities offer professional courses in forestry after the higher secondary education in biology or after bachelor level study of zoology and botany.

Medicine / Surgery:

The profession of medicine deals with diagnosis and treatment of diseases in human. In surgery the parts of the body may be repaired, replaced or removed, for example the removal of stones through renal surgery, transplantation of kidney, liver etc. Both these professions are studied in the same basic course (MBBS) and then students go for specializations.

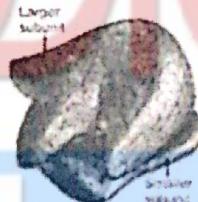
Fisheries:

Fisheries is the professional study of fish production. There are departments in Pakistan where professionals of fisheries are employed. They serve for enhancing the quality and quantity of fish production. In Pakistan, this profession can be adopted after the bachelor or masters level study of zoology and fisheries.

Q.6.(a) Write down the structure and function of ribosomes. (3)

Ans **Structure and function of ribosomes:**

Ribosomes are tiny granular structures that are either floating freely in cytoplasm or are bound to endoplasmic reticulum. Each ribosome is made up of almost equal amounts of proteins and ribosomal RNA. Ribosomes are not bound by membranes and so are also found in prokaryotes. Eukaryotic ribosomes are slightly larger than prokaryotic ones.



Ribosomes are the sites of protein synthesis. Protein synthesis is extremely important to cells, and so large numbers of ribosomes are found throughout the cells. When a ribosome is not working, it disassembles into two smaller units.

(b) Write note on osmosis and diffusion. (4)

Ans **Differences between diffusion and osmosis**

| Diffusion | Osmosis |
|--|--|
| (i) It involves the movement of molecules from a region of higher concentration to the region of lower | (i) It involves the movement of water from a solution of lesser solute concentration to a solution of higher |

concentration.

(ii) It can occur without a semipermeable membrane.

(iii) It equalizes the concentration of diffusible molecules throughout the medium.

solute concentration.

(ii) It always takes place through semipermeable membrane.

(iii) It does not equalize the concentration of diffusible molecules throughout the medium.

Q.7. (a) Write any three uses of enzymes.

(3)

Ans **Uses of enzymes:**

Enzymes are extensively used in different industries for fast chemical reactions. For example:

1. Food industry:

Enzymes that break starch into simple sugars are used in the production of white bread, buns, etc.

2. Brewing industry:

Enzymes break starch and proteins. The products are used by yeast for fermentation (to produce alcohol).

3. Paper industry:

Enzymes break starch to lower its viscosity that aids in making paper.

(b) Describe about four stages of mitosis.

(4)

Ans **“Phases of Mitosis”**

1- Prophase:

At the onset of prophase, chromatin condenses into highly ordered structures called chromosomes. Since the genetic material has already been duplicated earlier in phase, each chromosome is made of two sister chromatids, bound together at the same centromere. Each chromosome also has kinetochore at centromere. Kinetochore is a complex protein structure that is the point where spindle fibers attach.

Each centriole duplicates and thus two daughter centrosomes are formed. Both centrosomes migrate to the

opposite poles of cell. Here, they give rise to microtubules by joining tubulin proteins present in cytoplasm. The microtubules thus formed are called spindle fibres.

2- Metaphase:

When spindle fibres have grown to sufficient length, some spindle fibres, known as kinetochore fibres, attach with the kinetochores of chromosomes. Two kinetochore fibres from opposite poles attach with each chromosome. Chromosomes arrange themselves along the equator of cell forming a metaphase plate. A number of other fibres (non-kinetochore) from the opposite centrosomes attach with each other.

3- Anaphase:

When a kinetochore spindle fibre connects with the kinetochore of chromosome, it starts to pull toward the originating centrosomes. The pulling force divides the chromosome's sister chromatids and they separate. These sister chromatids are now sister chromosomes, and they are pulled apart toward the respective centrosomes. The other spindle fibres (non-kinetochore) also elongate. At the end of anaphase, cell has succeeded in separating identical copies of chromosomes into two groups at the opposite poles.

4- Telophase:

Telophase is a reversal of prophase. A new nuclear envelope forms around each set of separated chromosomes. Both sets of chromosomes, now surrounded by new nuclear envelopes, unfold back into chromatin. Nuclear division is completed, but cell division has yet one more step to complete.

Q.8. (a) Explain role of calcium and iron in animals. (3)

Ans → Role of Calcium and Iron:

Calcium is essential for the development and maintenance of bones and teeth. It is also needed for maintaining cell membranes and connective tissues and

for the activation of several enzymes. Calcium also aids in blood clotting. Humans get calcium from milk, cheese, egg yolk, beans, nuts, cabbage, etc. Deficiency of calcium causes spontaneous discharge of nerve impulses which may result in tetany, bones also become soft, blood clots slowly and wounds heal slowly.

Iron plays a major role in oxygen transport and storage. It is a component of haemoglobin in red blood cells and myoglobin in muscle cells. Cellular energy production also requires iron. It acts as cofactor for many enzymes of cellular respiration. Iron also supports immune function. Humans get iron from red meat, egg yolk, whole wheat, fish, spinach, mustard, etc. Its deficiency is the most common nutrient deficiency worldwide. Iron-deficiency causes anaemia.

(b) Write note on dietary fibres.

(4)

Ans **Dietary Fibre:**

Dietary fibre (also known as "roughage") is the part of human food that is indigestible. It is found only in plant foods and it moves undigested through stomach and small intestine and into colon. The insoluble dietary fibre travels quickly through small intestines. Its sources are wheat bran, cereals and skins of many fruits and vegetables. The soluble dietary fibre breaks down as it passes through alimentary canal. Its sources are oats, beans, barley, and many fruits and vegetables.

Fibre prevents and relieves constipation by stimulating the contraction of intestinal muscles. Avoiding constipation reduces the risk of many other diseases. Soluble fibre helps in lowering blood cholesterol and sugar levels. Insoluble fibre speeds up the movement of carcinogens (cancer causing agents) from intestine.

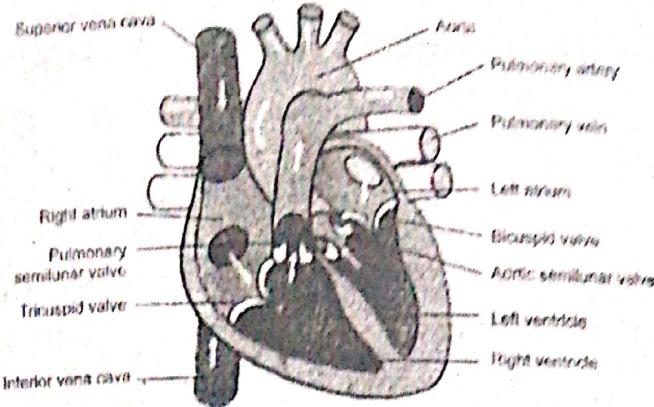
Q.9. (a) What is the role of chlorophyll and light in photosynthetic process? Explain. (3)

Ans During photosynthesis, the light energy is converted into chemical energy. When light falls on the surface of leaves, only 1% of it is absorbed by the leaf. While the remaining is reflected or transmitted from the leaf surface. Moreover, the light rays of different wavelengths are not only differently absorbed by the photosynthetic pigments but are effective differently, too. It has been found that blue and red wavelengths carryout more photosynthesis. In addition, the photosynthetic pigments are organized in the form of clusters called as 'photosystems'. In thylakoid membranes of the chloroplasts, the 'chlorophyll' 'a' is the main photosynthetic pigment. While others are accessory pigments such as chlorophyll 'b' and carotenoids. Some wavelengths of light are not absorbed by 'chlorophyll' 'a' but rather by accessory pigments.

(b) What four chambers make the human heart and how blood flows through these chambers? (4)

Ans The human heart works as a double pump. It receives deoxygenated (oxygen poor) blood from different parts of the body and pumps it to the lungs. At the same time, it receives oxygenated (oxygen rich) blood from lungs and sends it to all parts of the body. Within the heart chambers, the oxygenated and deoxygenated blood remain separated. The right atrium receives deoxygenated blood from the body through superior and inferior vena cava. When the right atrium contracts, the blood enters into right ventricle. In between the right atrium and right ventricle, tricuspid valve is found. When the right ventricle contracts, the blood goes towards lungs. The tricuspid valve prevents the backward flow of blood. When the left ventricle contracts, blood goes to all parts of the body via aorta. At the base of aorta, aortic semi-lunar valve is

found. It prevents the backward flow of blood from aorta to left ventricle.



**Fig. Human Heart, structure and blood flow.
(Part-III)**

(Practical Part)

Note: Attempt any Two (2) questions.

A-(i) You observed amoeba under microscope. Draw its diagram and label it. (3)

Ans For Answer see Paper 2015 (Group-I), Q.A-(i).

(ii) You have studied the mustard plant. Write the names of its four parts. (2)

Ans Vegetative parts of mustard plant are given below:
1- Root. 2- Stem. 3- Branches. 4- Leaves

B-(i) You performed the experiment, the effect of enzyme pepsin on meat. Write its results. (3)

Ans **Results:**

The Biuret test gives negative results in the tube in which pepsin was added. It confirms that no proteins are present in this test tube and all have been digested by the enzyme pepsin.

(ii) You have studied that CO_2 is necessary for photosynthesis, write the apparatus for this experiment. (2)

Ans **Apparatus required:**

A potted plant with healthy leaves, a 500 ml beaker, a forceps, a test tube, ethanol, dilute iodine solution, dropper, petri dish, potassium hydroxide solution and a glass flask with rubber cork.

C-(i) You have observed Iodine test for non-reducing sugar. Write its procedure. (3)

Ans For Answer see Paper 2015 (Group-I), Q.C-(i).

(ii) Write down the procedure of biuret test for protein. (2)

Ans **Biuret Test:**

- 1- Select two clean test tubes. With a wax pencil, label the tops of the test tubes "1" and "2".
 - To test tube 1, add 40 drops of albumin solution (a protein).
 - To test tube 2, add 40 drops of water.

- 2- Add 3 drops of Biuret solution to each test tube.

The positive-purple or pink color in test tube "1" indicates the presence of protein.

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